

## Remarks

### A. *Status of Application*

Claims 1-3, 6-9, and 28-30 were pending prior to this submission. Claims 1, 2, 9, 29, and 30 have been amended. Claim 8 has been canceled without prejudice. Claims 31-33 have been added. No new matter has been introduced. Claims 1-3, 6, 7, 9, and 28-33 are presented for reconsideration.

### B. *Amendment to the Specification*

The specification has been amended to correct an inadvertent typographical error.

### C. *Claim Objections*

The Office objected to language in claims 2, 29, and 30. Applicant has incorporated the suggestions of the Office. The objections are therefore believed to be overcome.

### D. *Response to Arguments*

Applicant appreciates the Office's acknowledgement that the previous rejections have been overcome.

### E. *Section 112*

Claims 1-3 and 28-30 stand rejected under Section 112 as allegedly lacking written description. The Office alleges that written description is not satisfied with respect to the following claimed energy range feature (presented in bold in the Office action as follows): "detecting an emerging photon beam within an energy **range from about 1 MeV to about 50 MeV** from the fissile material with an array of fission-fragment detectors, a first set of scintillator paddles, and a second set of scintillator paddles ... ." Applicant respectfully traverses.

The Office is directed to FIG. 6 of the present specification. That figure shows detection in the range from about 1 MeV to 50 MeV (see horizontal axis). The specification at page 14, lines 6-18 explains that figure, including an explanation of different signals from different detection components. See also specification at pages 7-8 (describing a suitable energy range).

Applicant respectfully asserts that the Office has not carried its burden with respect to a written description rejection, especially in light of the explicit support cited above. Applicant respectfully believes this rejection is overcome.

*F. Section 103*

Claims 1-3, 6-9, and 28-30 are rejected as being obvious in view of US Patent No. 5,524,133 ("Neale") in view of articles by Gunther and Groom. Applicant respectfully traverses.

Amended claim 1 recites, in part:

detecting an emerging photon beam within an energy range from about 1 MeV to about 50 MeV from the fissile material with **an array of fission-fragment detectors, a first set of scintillator paddles, and a second set of scintillator paddles**, wherein the array of fission-fragment detectors, the first set of scintillator paddles, and the second set of scintillator paddles are **sensitive to different ranges of photon beam energy**;

obtaining a first signal from the array of fission-fragment detectors, a second signal from the first set of scintillator paddles, and a third signal from the second set of scintillator paddles, **each signal indicative of photon yield within the different ranges of photon beam energy**; and

**determining a photon energy regime of the emerging photon beam through identification of a drop in photon yield** in at least one of the three signals, the determined photon energy regime identifying the fissile material.

Such features are nowhere disclosed or suggested by the cited art, alone or in combination. Claim 1 was amended to incorporate concepts from now-canceled claim 8 involving data analysis. Claim 1 was also amended to recite the determination of a photon energy regime through identification of a drop in photon yield, which is supported in the specification at least at page 8, lines 7-10 and page 14, lines 14-17. For further, non-limiting explanation about the claimed signals and data analysis, please see the specification at page 14, along with Figure 6.

*1. Neale does not disclose or suggest features of the claims.*

Neale is directed to a method and apparatus for detecting the mean atomic number of a mass of material by subjecting the material to two groups of X-rays: lower-energy X-rays and

higher-energy X-rays. *See* Abstract. Neale defines the mean number of lower-energy X-rays transmitted through the material as  $N_A$  and the mean number of the higher-energy X-rays transmitted through the material as  $N_B$ . *See* Abstract; column 2, lines 5-23. Neale then computes the ratio of  $N_A/N_B$  and uses a lookup table to find the average atomic number of the material, based on the ratio. *See* Abstract; column 2, lines 5-23.

Neale does not disclose or suggest the use of the three distinct, claimed detection components of amended claim 1: (1) an array of fission-fragment detectors, (2) a first set of scintillator paddles, and (3) a second set of scintillator paddles. Instead, Neale discusses a completely different detection scheme: Neale describes a thin crystal followed by a low-Z beam hardener followed by a series of high-Z converters that alternate with and are sandwiched by thin crystals. *See* column 3, lines 48-58.

Neale also nowhere discloses or suggests the claimed data analysis techniques of amended claim 1: obtaining separate signals for each of the distinct detection components and determining an energy regime through identification of a drop in photon yield in at least one of those signals so that one can ultimately identify the fissile material. Instead, as discussed above, Neale teaches a completely different technique: Neale describes determining the ratio  $N_A/N_B$  (from two X-ray energy groups) and then using a lookup table to correlate to a specific atomic number. *See* Abstract; column 2, lines 5-23.

The Office points to element 22 in Figure 4 of Neale as meeting claim limitations involving the three claimed detection components and the claimed energy ranges. *See* Office Action at page 5. Applicant respectfully points out that this characterization of Neale finds no support and is incorrect. Element 22 of Neale is simply described as a "detector." *See* column 11, line 8. Mentioning a generic detector cannot be found to amount to a disclosure or teaching of the specific and distinct three detection components recited in amended claim 1. Nor does this detector of Neale implicate the specific data analysis techniques recited in amended claim 1.

The Office also characterizes Neale as involving fissile material (*see* Office Action page 5), yet Neale nowhere mentions fissile material (unlike present, amended claim 1). Neale, moreover, nowhere discusses atomic numbers beyond  $Z=14$  (silicon), whereas embodiments of the present application encompassed by the claims are sensitive to Uranium and other high-Z material.

As described below, the significant legal and factual shortcomings of Neale are not cured by the secondary references cited by the Office and Applicant therefore respectfully submits that the claims are currently in condition for allowance.

2. *Gunther does not disclose or suggest features of the claims.*

Gunther is cited as teaching or suggesting the inclusion of a PPAD detector into the device of Neale. As implicitly recognized by the Office, Gunther lacks any teaching or suggestion concerning the three detection components and/or the data analysis techniques argued above. Accordingly, even through combination with Gunther, Neale still does not include the elements of amended claim 1, which are argued above.

Moreover, combination with Neale would fundamentally change the principle of operation of Neale, meaning obviousness is not established pursuant to MPEP 2143.01. Specifically, as mentioned above, Neale is directed to a technique that takes a ratio involving **two** X-ray energy regimes. A lookup table then correlates that specific ratio to an atomic number. Inclusion of a PPAD would add at least one other variable beyond the two needed to calculate the ratio  $N_A/N_B$  taught by Neale and would require a different data analysis technique altogether, nowhere taught or suggested by Neale or Gunter (or Groom, discussed below).

3. *Groom does not disclose or suggest features of the claims.*

Groom is cited in an attempt to argue motivation to combine the cited references. Groom nowhere discloses or suggests the claim elements argued above. Further, Groom does not overcome the lack of motivation to combine the cited references. Groom nowhere suggests that one should, or could, utilize the specific detection setup and data analysis techniques presently claimed in amended claim 1, nor does the Office suggest otherwise. Groom's failure to aid in an obviousness position is further highlighted by Neale's clear requirement that **two** X-ray energy regimes be used to form a **ratio** ( $N_A/N_B$ ) that is then used with a lookup table to determine an atomic number. Thus, even in combination with Groom and/or Gunther, Neale does not render obvious the specific, claimed technique that uses three detector components along with specific data analysis techniques.

4. *New Claims*

Applicant has added new claims 31-33, which are patentable for at least the same reasons given with respect to amended claim 1. Further, claims 31-33 (and the other dependent claims of the present application) are patentable for independent reasons. For example, the cited art does not teach or suggest the specific energy ranges of claim 31, much less the energy ranges associated with the specific detection components that are being claimed. The cited art does not teach or suggest the plastic scintillation paddles of claim 32 or the overlapping energy ranges of claim 33. Applicant reserves the right to argue additional, independent reasons for patentability based on the subject matter of one or more dependent claims.

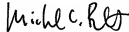
5. *Conclusion*

Neale, Gunther, and Groom do not disclose, teach, or suggest the features of amended claim 1, alone or in any combination. Further, there is no motivation to combine such references (and, even if combined, claim 1 is still not met). For example, the argued combinations would fundamentally change the operating principles of Neale. State differently, it can be said that Neale *teaches away* from the Office's proposed combinations because those combinations (*e.g.*, adding a PPAD) would destroy or modify Neale's technique of looking up atomic numbers by simply using two calculated values  $N_A$  and  $N_B$  that are based on interrogation by two different X-ray energy regimes. Any arguments that it would have been obvious to fundamentally change both the detection hardware (Neale does not use the three separate detection components claimed) and data analysis techniques (Neale uses a completely different ratio/lookup table analysis) to match claim 1 would amount to impermissible hindsight that is not supported by any of the cited references and which does not establish obviousness pursuant to MPEP 2145.

Applicant believes that these remarks fully respond to all outstanding matters for this application. Applicant respectfully requests that the rejections of all claims be withdrawn so the claims may swiftly pass to issuance.

Should the Examiner desire to sustain any of the rejections discussed in this submission, the courtesy of a telephone conference between the Examiner, the Examiner's supervisor, and the undersigned attorney at 512-536-3018 is respectfully requested in advance.

Respectfully submitted,



Michael C. Barrett  
Reg. No. 44,523  
Attorney for Applicant

FULBRIGHT & JAWORSKI L.L.P.  
600 Congress Avenue, Suite 2400  
Austin, Texas 78701  
Telephone: (512)536-3018  
Facsimile: (512) 536-4598

Date: September 7, 2007